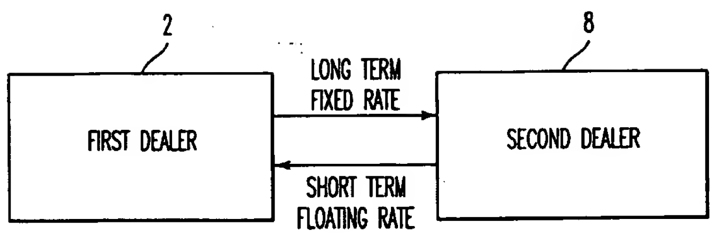
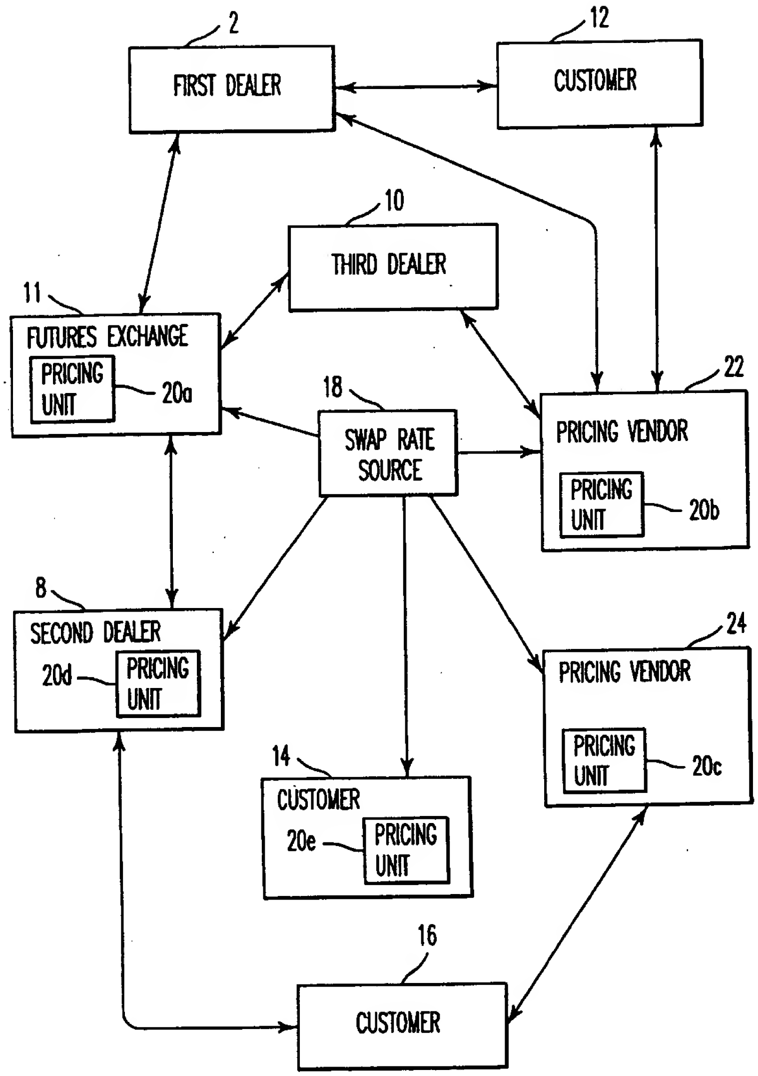



*FIG. 1*
*PRIOR ART*



2
FIRST DEALER
12
CUSTOMER
10
THIRD DEALER
11
FUTURES EXCHANGE
PRICING UNIT
20a
18
SWAP RATE SOURCE
22
PRICING VENDOR
PRICING UNIT
20b
8
SECOND DEALER
20d
PRICING UNIT
24
PRICING VENDOR
PRICING UNIT
20c
14
CUSTOMER
20e
PRICING UNIT
16
CUSTOMER


*FIG. 2*

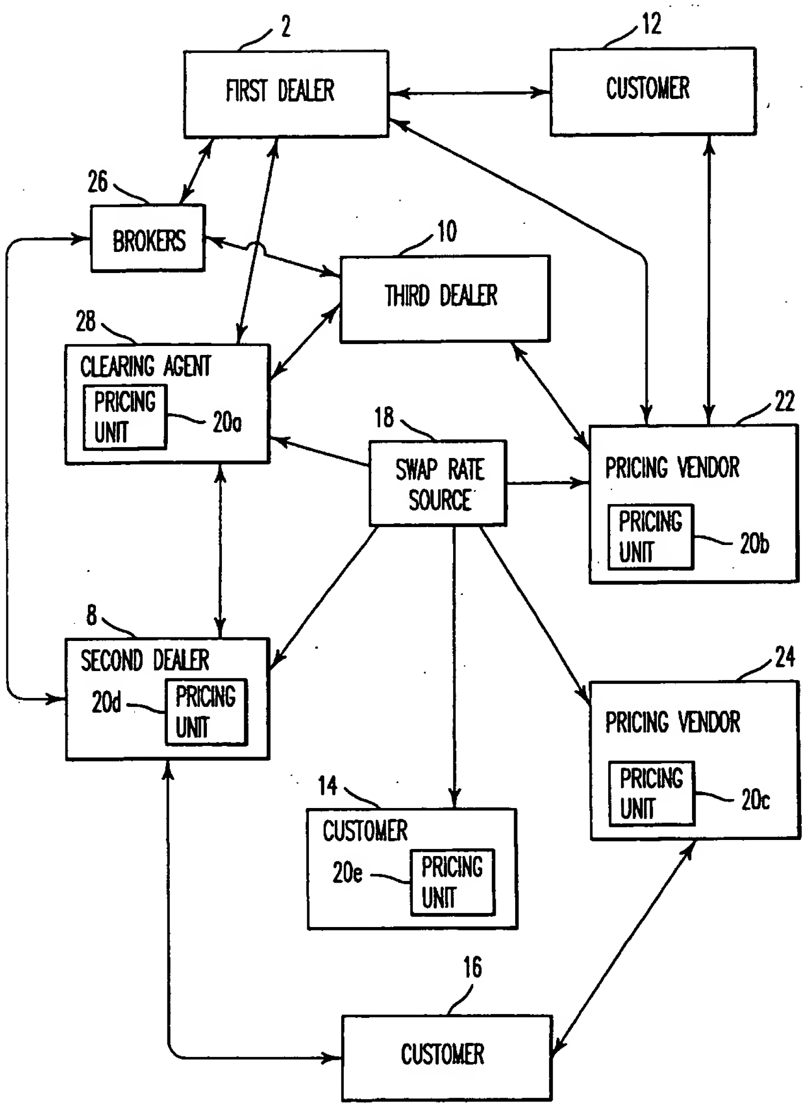

2
FIRST DEALER
12
CUSTOMER
26
BROKERS
10
THIRD DEALER
28
CLEARING AGENT
PRICING UNIT
20a
18
SWAP RATE SOURCE
22
PRICING VENDOR
PRICING UNIT
20b
8
SECOND DEALER
20d
PRICING UNIT
24
PRICING VENDOR
PRICING UNIT
20c
14
CUSTOMER
20e
PRICING UNIT
16
CUSTOMER

*FIG. 3*

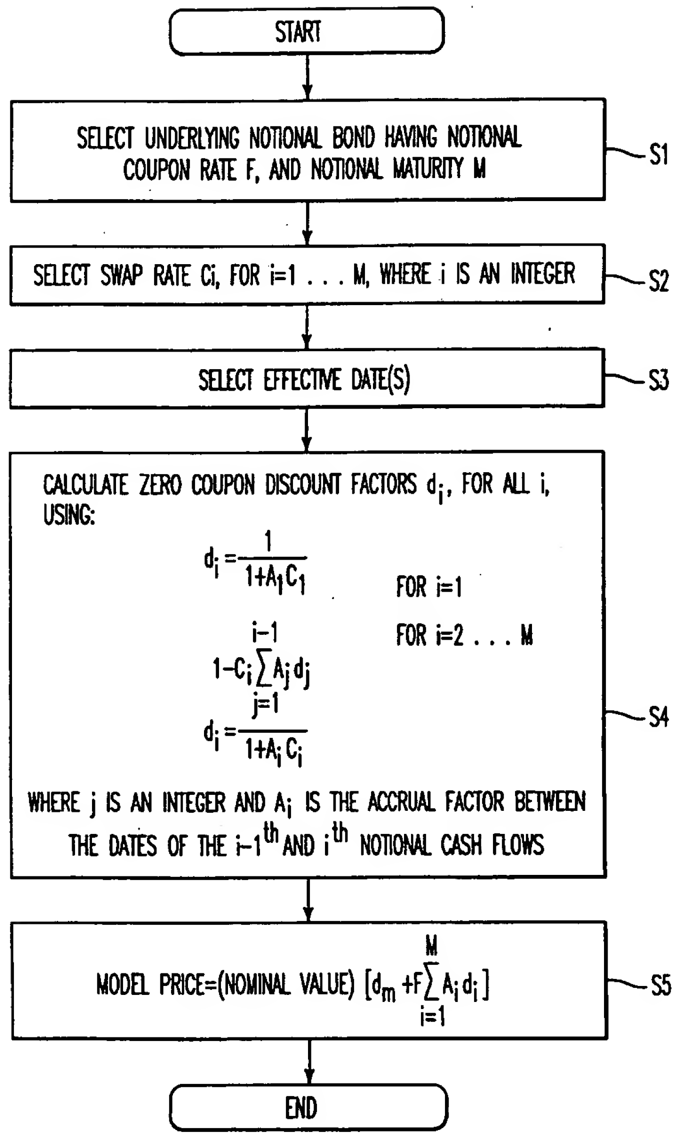
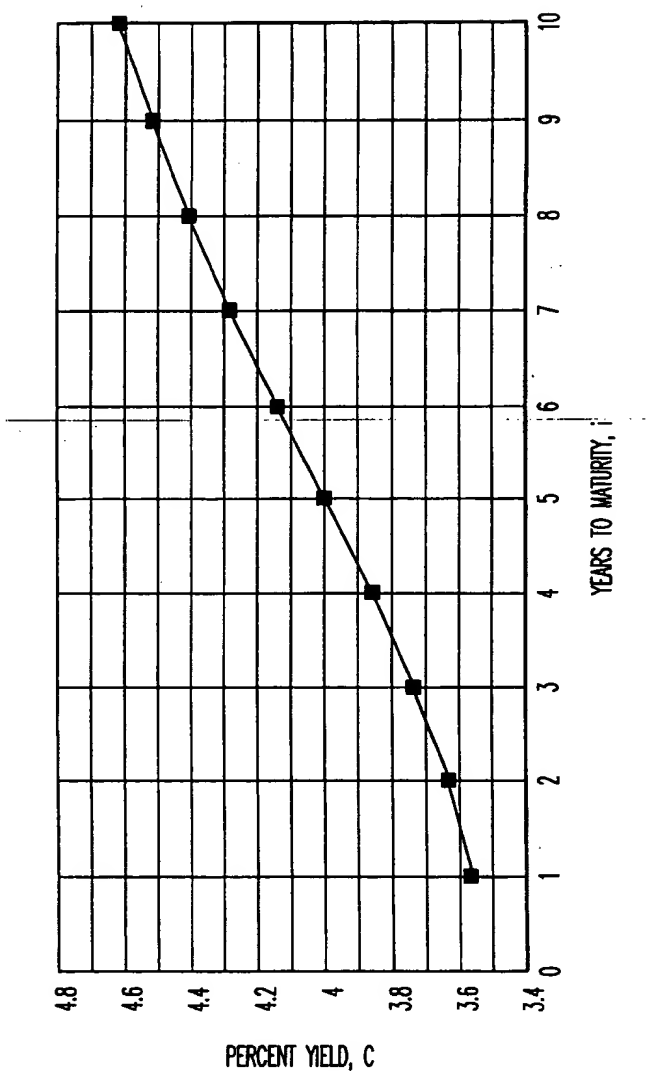

START
SELECT UNDERLYING NOTIONAL BOND HAVING NOTIONAL COUPON RATE F, AND NOTIONAL MATURITY M
S1
SELECT SWAP RATE Ci, FOR i=1 . . . M, WHERE i IS AN INTEGER
S2
SELECT EFFECTIVE DATE(S)
S3
CALCULATE ZERO COUPON DISCOUNT FACTORS $d_i$, FOR ALL i, USING:
$d_i = \frac{1}{1+A_1C_1}$ FOR i=1
$d_i = \frac{1-C_i\sum_{j=1}^{i-1} A_j d_j}{1+A_i C_i}$ FOR i=2 . . . M
WHERE j IS AN INTEGER AND $A_i$ IS THE ACCRUAL FACTOR BETWEEN THE DATES OF THE $i-1^{th}$ AND $i^{th}$ NOTIONAL CASH FLOWS
S4
MODEL PRICE=(NOMINAL VALUE) $[d_m + F\sum_{i=1}^{M} A_i d_i]$
S5
END

*FIG. 4A*



10
9
8
7
6
5
4
3
2
1
0
YEARS TO MATURITY, i
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
PERCENT YIELD, C


*FIG. 4B*

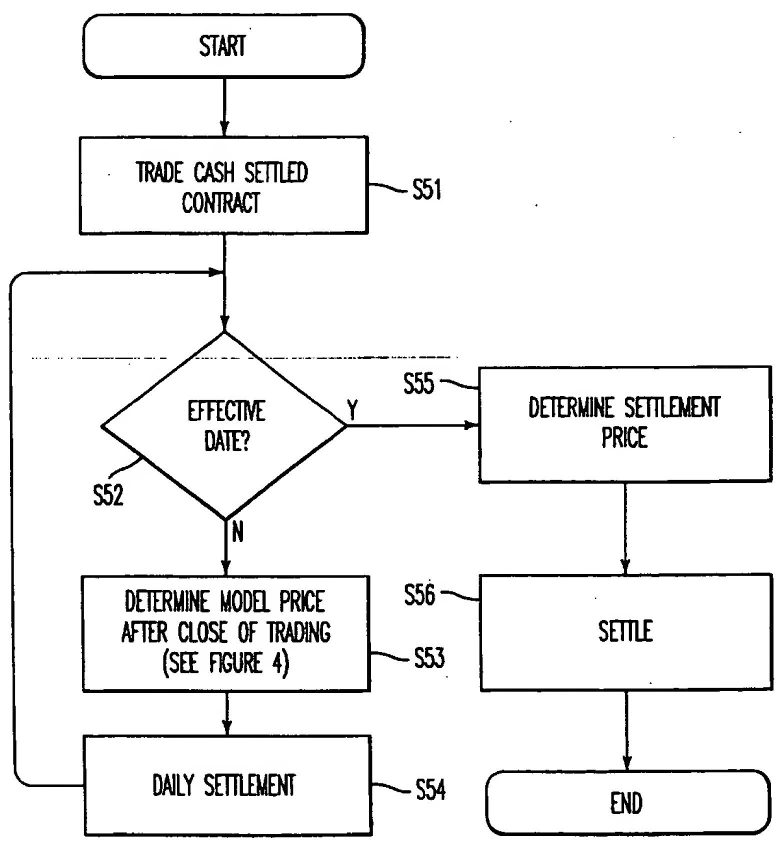

START
TRADE CASH SETTLED CONTRACT
S51
EFFECTIVE DATE?
S52
Y
N
S55
DETERMINE SETTLEMENT PRICE
DETERMINE MODEL PRICE AFTER CLOSE OF TRADING (SEE FIGURE 4)
S53
S56
SETTLE
DAILY SETTLEMENT
S54
END

*FIG. 5A*

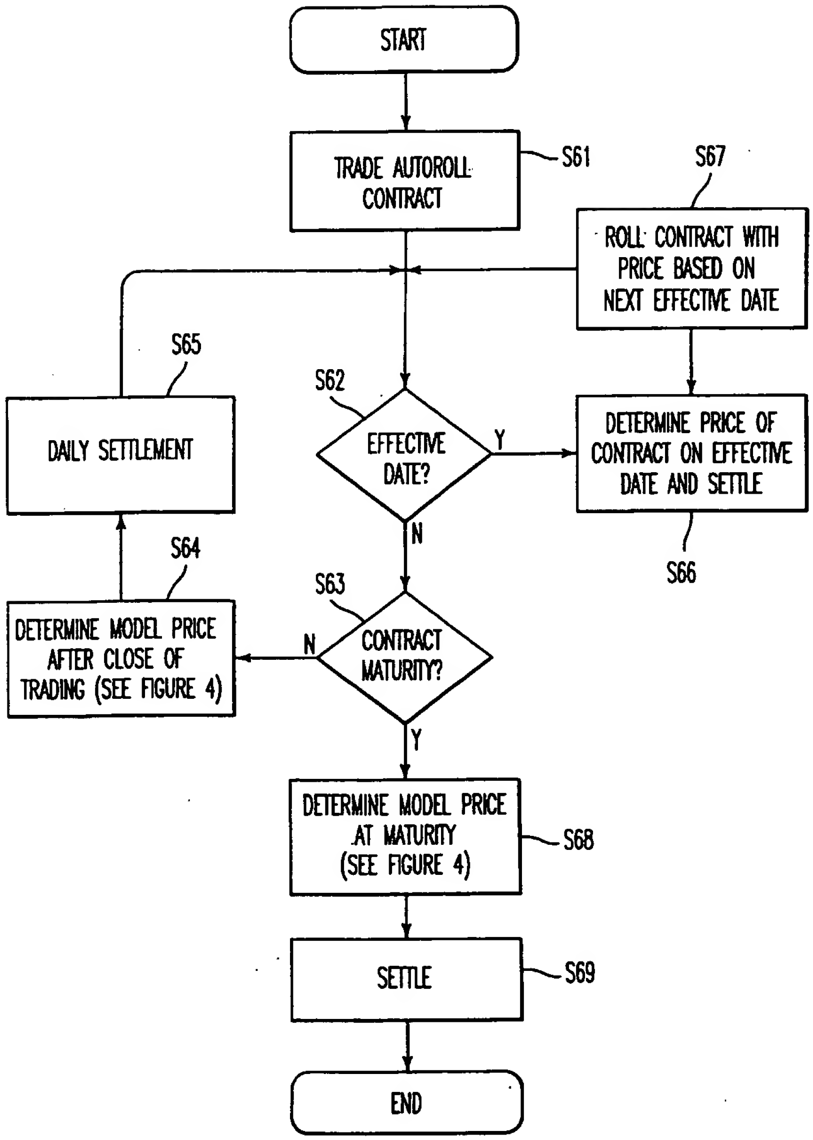

START
TRADE AUTOROLL CONTRACT
S61
S67
ROLL CONTRACT WITH PRICE BASED ON NEXT EFFECTIVE DATE
S65
DAILY SETTLEMENT
S62
EFFECTIVE DATE?
Y
DETERMINE PRICE OF CONTRACT ON EFFECTIVE DATE AND SETTLE
S66
N
S64
S63
DETERMINE MODEL PRICE AFTER CLOSE OF TRADING (SEE FIGURE 4)
N
CONTRACT MATURITY?
Y
DETERMINE MODEL PRICE AT MATURITY (SEE FIGURE 4)
S68
SETTLE
S69
END

*FIG. 5B*

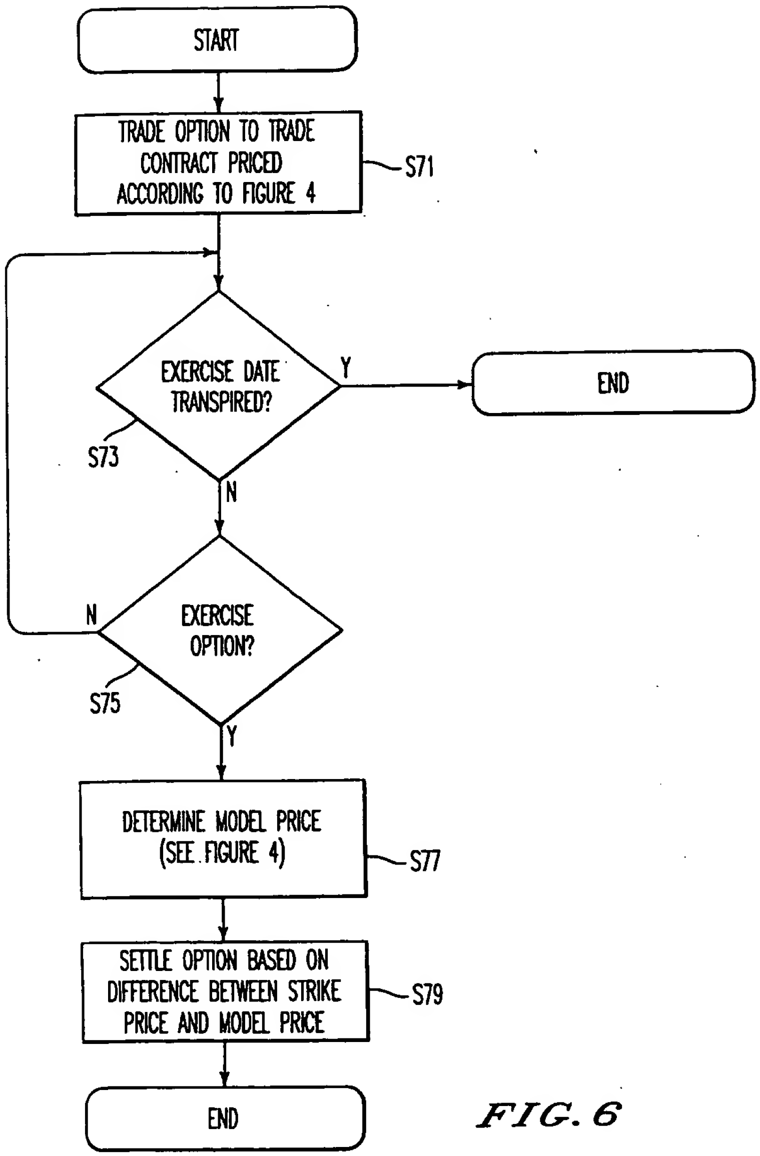

START
TRADE OPTION TO TRADE CONTRACT PRICED ACCORDING TO FIGURE 4
S71
EXERCISE DATE TRANSPIRED?
S73
Y
END
N
EXERCISE OPTION?
S75
N
Y
DETERMINE MODEL PRICE (SEE FIGURE 4)
S77
SETTLE OPTION BASED ON DIFFERENCE BETWEEN STRIKE PRICE AND MODEL PRICE
S79
END

*FIG. 6*

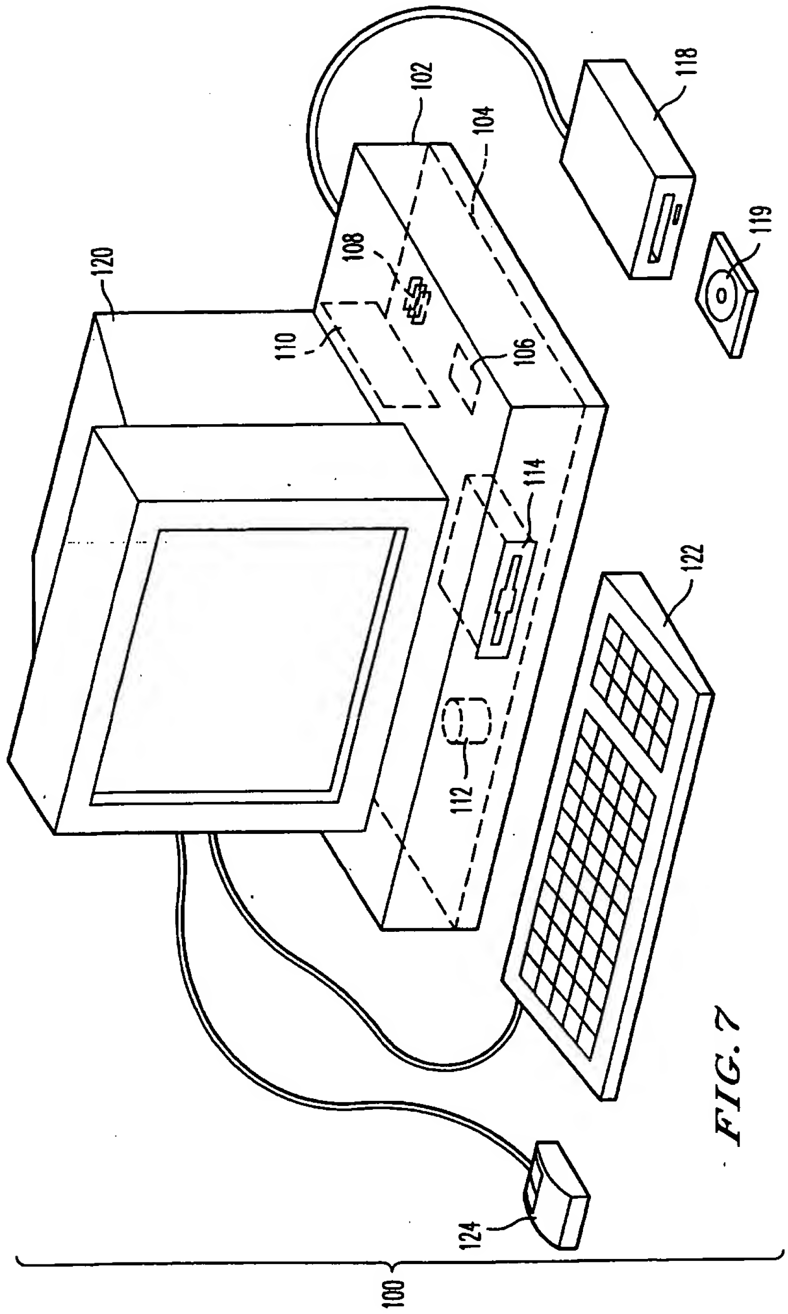



FIG. 7

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | INPUTS | | | | |
| 2 | (Alter Blue Figures in Green Background/DropDown Lists Only) | | | | |
| 3 | | | | | |
| 4 | Swap Rates (taken on Last Trading Day) | | | | |
| 5 | Swaps (Fixed Side) Daycount | 360 | | | |
| 6 | Swap Settlement Delay (Days) | 2 | | | |
| 7 | Libor Daycount | 360 | | | |
| 8 | Last Trading Day | 14-Dec-98 | | | |
| 9 | | | | | |
| 10 | Type | Source | Term | Rate | |
| 11 | | | Months | | |
| 12 | Zero Coupon | LIBOR | 1 | 3.457 | |
| 13 | Zero Coupon | LIBOR | 3 | 3.469 | |
| 14 | Zero Coupon | LIBOR | 6 | 3.469 | |
| 15 | Zero Coupon | LIBOR | 9 | 3.531 | |
| 16 | | | Years | | |
| 17 | Fixed Income | IRS mkt | 1 | 3.570 | |
| 18 | Fixed Income | IRS mkt | 2 | 3.628 | |
| 19 | Fixed Income | IRS mkt | 3 | 3.731 | |
| 20 | Fixed Income | IRS mkt | 4 | 3.860 | |
| 21 | Fixed Income | IRS mkt | 5 | 4.000 | |
| 22 | Fixed Income | IRS mkt | 6 | 4.139 | |
| 23 | Fixed Income | IRS mkt | 7 | 4.276 | |
| 24 | Fixed Income | IRS mkt | 8 | 4.409 | |
| 25 | Fixed Income | IRS mkt | 9 | 4.522 | |
| 26 | Fixed Income | IRS mkt | 10 | 4.621 | |

| Notional Cash Flows | |
|---|---|
| Notional Coupon | 6 |
| Start Date | 16-Dec-98 |
| Initial Maturity | 10 |
| End Date | 16-Dec-08 |

| Delivery Month Details | | |
|---|---|---|
| Expiring Front Month | Effective Date | Remaining Maturity |
| Dec-98 ▼ | 16-Dec-98 | 10 |
| Back Month | Effective Date | |
| Mar-99 | 17-Mar-99 | 9 3/4 |

| OUTPUTS (J) | (k) |
|---|---|
| Front Month | |
| Effective Date | 16-Dec-98 |
| EDSP | 111.03 |
| Back Month | |
| Effective Date | 17-Mar-99 |
| Fair Value (as of Front Month Effective Date) | 110.49 |
| Calendar Roll | |
| Calendar Roll (price basis points) | 54 |

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FIG. 8

| | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Source | Term | Maturity of par swap | Day | Rate | "Following" Maturity | Day of "Following" Maturity | Accrual Factor. | | Zero Coupon Discount Factor (term from Front Month Effective Date) |
| 2 | | Year(s) | 16-Dec-98 | Wednesday | | 16-Dec-98 | Wednesday | | | 1.000000 |
| 3 | BBA LIBOR | 1/12 | 16-Jan-99 | Saturday | 3.457 | 18-Jan-99 | Monday | 0.091666667 | | 0.996841 |
| 4 | BBA LIBOR | 1/4 | 16-Mar-99 | Tuesday | 3.469 | 16-Mar-99 | Tuesday | 0.25 | | 0.991403 |
| 5 | BBA LIBOR | 1/2 | 16-Jun-99 | Wednesday | 3.469 | 16-Jun-99 | Wednesday | 0.505555556 | | 0.982766 |
| 6 | BBA LIBOR | 3/4 | 16-Sep-99 | Thursday | 3.531 | 16-Sep-99 | Thursday | 0.761111111 | | 0.973827 |
| 7 | IRS mkt | 1 | 16-Dec-99 | Thursday | 3.570 | 16-Dec-99 | Thursday | 1.000 | 0.965531 | 0.965531 |
| 8 | IRS mkt | 2 | 16-Dec-00 | Saturday | 3.628 | 18-Dec-00 | Monday | 1.006 | 0.936178 | 0.9310060 |
| 9 | IRS mkt | 3 | 16-Dec-01 | Sunday | 3.731 | 17-Dec-01 | Monday | 0.997 | 0.893233 | 0.8957207 |
| 10 | IRS mkt | 4 | 16-Dec-02 | Monday | 3.860 | 16-Dec-02 | Monday | 0.997 | 0.856662 | 0.8590481 |
| 11 | IRS mkt | 5 | 16-Dec-03 | Tuesday | 4.000 | 16-Dec-03 | Tuesday | 1.000 | 0.821092 | 0.8210922 |
| 12 | IRS mkt | 6 | 16-Dec-04 | Thursday | 4.139 | 16-Dec-04 | Thursday | 1.000 | 0.782488 | 0.7824880 |
| 13 | IRS mkt | 7 | 16-Dec-05 | Friday | 4.276 | 16-Dec-05 | Friday | 1.000 | 0.743496 | 0.7434964 |
| 14 | IRS mkt | 8 | 16-Dec-06 | Saturday | 4.409 | 18-Dec-06 | Monday | 1.006 | 0.708206 | 0.7042934 |
| 15 | IRS mkt | 9 | 16-Dec-07 | Sunday | 4.522 | 17-Dec-07 | Monday | 0.997 | 0.664801 | 0.6666523 |
| 16 | IRS mkt | 10 | 16-Dec-08 | Tuesday | 4.621 | 16-Dec-08 | Tuesday | 0.997 | 0.628558 | 0.6303087 |

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*FIG. 9*

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | Cash flow (in years from Start day) | Notional Cash Flow (CF) Dates | "Following" Cash Flow Dates | Accrual Factor (30E/360) | Notional Cash Flow | Adjusted Cash Flow |
| 4 | Start Date | 16-Dec-98 | 16-Dec-98 | | | |
| 5 | 1 | 16-Dec-99 | 16-Dec-99 | 1000 | 6 | 6 |
| 6 | 2 | 16-Dec-00 | 18-Dec-00 | 1.006 | 6 | 6.033333333 |
| 7 | 3 | 16-Dec-01 | 17-Dec-01 | 0.997 | 6 | 5.983333333 |
| 8 | 4 | 16-Dec-02 | 16-Dec-02 | 0.997 | 6 | 5.983333333 |
| 9 | 5 | 16-Dec-03 | 16-Dec-03 | 1.000 | 6 | 6 |
| 10 | 6 | 16-Dec-04 | 16-Dec-04 | 1.000 | 6 | 6 |
| 11 | 7 | 16-Dec-05 | 16-Dec-05 | 1.000 | 6 | 6 |
| 12 | 8 | 16-Dec-06 | 18-Dec-06 | 1.006 | 6 | 6.033333333 |
| 13 | 9 | 16-Dec-07 | 17-Dec-07 | 0.997 | 6 | 5.983333333 |
| 14 | 10 | 16-Dec-08 | 16-Dec-08 | 0.997 | 106 | 105.9833333 |

*FIG. 10A*

| G | H | I | J | K | L |
|---|---|---|---|---|---|
| | | | | | |
| Discount Factor (From Front Effective Date) | PV (Front Effective Date) of Adj Cash Flows | PV (Front Effective Date) of Cash Flows After front Month | PV (Back Effective Date) of Cash Flows After Back Month | AI at Front Month Effective Date | AI at Back Month Effective Date |
| | | | | 0 | 1.516666667 |
| 0.966 | 5.793 | 5.793183354 | 5.843974503 | 0 | 0 |
| 0.931 | 5.617 | 5.617069558 | 5.666316647 | 0 | 0 |
| 0.896 | 5.359 | 5.35939573 | 5.40638369 | 0 | 0 |
| 0.859 | 5.140 | 5.139971205 | 5.185035383 | 0 | 0 |
| 0.821 | 4.927 | 4.926553083 | 4.969746138 | 0 | 0 |
| 0.782 | 4.695 | 4.694927743 | 4.736090047 | 0 | 0 |
| 0.743 | 4.461 | 4.460978687 | 4.500089866 | 0 | 0 |
| 0.704 | 4.249 | 4.249236816 | 4.28649157 | 0 | 0 |
| 0.667 | 3.989 | 3.988803133 | 4.023774456 | 0 | 0 |
| 0.630 | 66.802 | 66.80221772 | 67.3878994 | | |

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FIG. 10B

| | |
|---|---|
| FIG.11A | FIG.11B |
| FIG.11C | FIG.11D |

*FIG. 11*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Today | 12/11/98 | | | | | | | |
| Swap/Libor Delay (days) | 2 | | | | | | | |
| Swap/Libor Settle | 12/15/98 | | | | | | | |
| Delivery Day | 12/16/98 | | | | | | | |
| Last Trading Day | 12/14/98 | | | | | | | |
| | | | | | | | | |
| Notional Coupon | 6 | | | | | | | |
| LPB Maturity | 10 | | | | | | | |
| | | | | Implied Futures Price (IPF) Calculator-alter blue figures/drop-down box only | | | | |
| Interpolation | 2 | | | | | | | |
| | | | | | | Outputs | | |
| | | | Dirty Price (present value) as of trade date | Implied Futures Price (IFP) | Implied Financing rate | Implied YTM/par swap rate at Expiry | Implied spot YTM | Delta Vector (Change in IFP) |
| | | | 101.54 | 101.56 | 3.46% | 4.801% | 4.801% | 8.0161 |
| | | | | | | | | |
| | | Rates to | Discount Factors | | | | | |
| Source | Nominal term (years) | DM Swap/Libor Rate | "Following" Maturity of depo/par swap | Accrual Factor | Zero Coupon discount factors | Par swap sensitivity | Number of notional cashflow | "Following" notional cashflow date |
| | 0 | | 12/15/98 | | 1.000000 | | 0 | 12/16/98 |
| Libor | 0.08333 | 3.470 | 1/15/99 | 0.086111 | 0.997021 | | 1 | 12/16/99 |
| Libor | 0.25 | 3.520 | 3/15/99 | 0.250000 | 0.991277 | | 2 | 12/18/00 |
| Libor | 0.5 | 3.590 | 6/15/99 | 0.505556 | 0.982174 | | 3 | 12/17/01 |
| Libor | 0.75 | 3.590 | 9/15/99 | 0.761111 | 0.973403 | | 4 | 12/16/02 |
| IRS market | 1 | 3.635 | 12/15/99 | 1.000000 | 0.964925 | 0.9649 | 5 | 12/16/03 |

*FIG. 11A*

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| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| IFP Sensitivity to 1 basis point implied yield shift | Dirty Price sensitivity to 1 basis point spot YTM shift | | | | | | | | | | |
| 7.8726 | 7.8746 | | | | | | | | | | |
| Notional Cash Flows | | | | Curve Adjustment | | | | | | | |
| Accrual Factor | Adjusted notional coupon/principal | PV of cash flow | (Delta Vector) Kick points on par curve by the following | | | | | | | | |
| | | | (basis points) | 1 | | 1 | | | | | |
| 1.000000 | 5.00000 | 4.824127 | 0 | 0.997021 | 4.823660 | 0.997021 | 4.824594 | | | | |
| 1.005556 | 5.02778 | 4.670045 | 0 | 0.991277 | 4.669141 | 0.991277 | 4.670950 | | | | |
| 0.997222 | 4.98611 | 4.446208 | 0 | 0.982174 | 4.444920 | 0.982174 | 4.447497 | | | | |
| 1.000000 | 4.98611 | 4.252615 | 0 | 0.973403 | 4.066833 | 0.973403 | 4.254258 | | | | |
| 1.000000 | 5.00000 | 4.068797 | 1 | 0.964832 | 3.870655 | 0.965018 | 4.070764 | | | | |

FIG. 11B

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| IRS market | 2 | 3.740 | 12/15/00 | 1.000000 | 0.929161 | | 6 | 12/16/04 |
| IRS market | 3 | 3.880 | 12/17/01 | 1.005556 | 0.891719 | | 7 | 12/16/05 |
| IRS market | 4 | 4.040 | 12/16/02 | 0.997222 | 0.852892 | 3.6413 | 8 | 12/18/06 |
| IRS market | 5 | 4.180 | 12/15/03 | 0.997222 | 0.813869 | 4.4529 | 9 | 12/17/07 |
| IRS market | 6 | 4.310 | 12/15/04 | 1.000000 | 0.774691 | 5.2276 | 10 | 12/16/08 |
| IRS market | 7 | 4.440 | 12/15/05 | 1.000000 | 0.735250 | 5.9628 | | |
| IRS market | 8 | 4.560 | 12/15/06 | 1.000000 | 0.696342 | 6.6592 | | |
| IRS market | 9 | 4.650 | 12/17/07 | 1.005556 | 0.659511 | 7.3223 | | |
| IRS market | 10 | 4.804 | 12/15/08 | 0.994444 | 0.618678 | 7.9376 | | |
| Linear Interpolation | 11 | 4.849 | 12/15/09 | 1.000000 | 0.586643 | 8.5242 | | |
| Linear Interpolation | 12 | 4.894 | 12/15/10 | 1.000000 | 0.555597 | 9.0798 | | |
| Linear Interpolation | 13 | 4.940 | 12/15/11 | 1.000000 | 0.525534 | 9.6054 | | |
| Linear Interpolatio | 14 | 4.985 | 12/17/12 | 1.005556 | 0.496314 | 10.1044 | | |
| IRS market | 15 | 5.030 | 12/16/13 | 0.997222 | 0.468259 | 10.5714 | | |

*FIG. 11C*

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.000000 | 5.00000 | 3.872902 | 1 | 0.928982 | 3.870655 | 0.929340 | 3.875150 | | | | |
| 1.000000 | 5.00000 | 3.675704 | 1 | 0.891460 | 3.673211 | 0.891977 | 3.678189 | | | | |
| 1.005556 | 5.02778 | 3.499496 | 1 | 0.852563 | 3.496776 | 0.853222 | 3.502219 | | | | |
| 0.997222 | 4.98611 | 3.288394 | 1 | 0.813476 | 3.285515 | 0.814262 | 3.291276 | | | | |
| 0.997222 | 104.98611 | 64.943158 | 1 | 0.774242 | 64.879642 | 0.775141 | 65.006742 | | | | |
| | | | 1 | 0.734752 | | 0.735749 | | | | | |
| | | | 1 | 0.695801 | | 0.696883 | | | | | |
| | | | 1 | 0.658933 | | 0.660089 | | | | | |
| | | | 1 | 0.618073 | | 0.619284 | | | | | |
| | | | 1 | 0.586012 | | 0.587275 | | | | | |
| | | | 1 | 0.554944 | | 0.556250 | | | | | |
| | | | 1 | 0.524864 | | 0.526204 | | | | | |
| | | | 1 | 0.495632 | | 0.496998 | | | | | |
| | | | 1 | 0.467567 | | 0.468952 | | | | | |

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*FIG. 11D*